

Abstract to be submitted to the Fourth IAA International Conference on low-cost Planetary Missions - Space Technology - Sensors and instrumentation session.

### **Programmable Intelligent Microtracker**

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An emerging area in spacecraft control and autonomy is vision onboard a spacecraft. This can be used for a variety of applications such as star tracking, space docking, feature tracking, formation flying, imaging, etc. Images typically involve a large amount of data and extensive processing. Therefore, onboard image processing is a relatively new phenomenon on micro spacecraft, where mass and power is an issue.

The Jet Propulsion Laboratory (JPL) has initiated a research project called the Programmable Intelligent Microtracker (PIM). The objective of the project is to develop a technological demonstration of a low mass and low power imager that demonstrates a number of vision applications for a micro spacecraft.

The miniaturization and low cost of the PIM is achieved by utilizing only two components. A DIMM-PC and an Active Pixel Sensor (APS) chip. The DIMM-PC is a commercial 66 MHz 486SX PC, including a 16 Mbyte solid-state hard disc and 16 Mbytes of RAM. It has a footprint of 1.5 x 2.5 inch. It interfaces directly to an APS chip through the parallel port, with no additional circuitry. The APS chip is designed at JPL. It has 512 x 512 pixels with on-chip A/D converters and it operates on a single 3.3 Volt power supply. The PIM is designed for use with a C-mount lens. Currently a wide field of view lens has been chosen for star tracking applications. The operating system is DOS.

At this point, the unit is a technological demonstration and no attempts have been made to qualify the unit for space applications. This paper will further describe the design of the PIM, its components and the testing of the imager. Important imager characteristics include read noise, quantum efficiency, dark current etc. Processor parameters include throughput, image rate etc. The performance of the PIM under night sky conditions will also be discussed.